**COMP7180 Assignment 2**

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**Problem 1**

**1.1**

Answers:

According to the domain , we can draw

1

-1

0

Then = = 1

c =

**1.2.1**

Answers:

Because the Domain of values is

We have get

Then the density function with respect to (w.r.t.) the random variable X is

**1.2.2**

Answers:

Let f(x) then

The f(x) is odd function, so

**1.3.1**

Base on the answer of 1.2.2, we get E(X) = E(Y) = 0

And we have cov(X,Y) = E[(X-E[X]\*(Y-E[Y]))] = E[XY] - E[X]E[Y] = E[XY]

When P(x,y) ≠ 0:

Then we get f(y) = y and f(x) =x are odd functions, so, E[XY] = \* 0 \* 0 = 0

Finally, cov(X,Y) = 0

**1.3.2**

According to the answer of 1.2.1, we get

And

But P(xy) != p(x)p(y), which proves the two random continuous variables are not independent.

**Problem 2**

**2.1**

Answers:

Then we can proof: P(A|B) = P(A ∩ B) / P(B) = (P(B|A)P(A)) / P(B)

**2.2**

Answers:

Let E1 be the event of choosing bag I, E2 the event of choosing bag II, and A be the event of drawing a green ball.

P(E1) = P(E2) = 0.5

P(A|E1) = P(drawing a green ball from bag I) = 8/11

P(A|E2) = P(drawing a green ball from bag I) = 2/7

P(A) = P(A|E1)\*P(E1) + P(A|E2)\*P(E2) = 8/11\*1/2 + 2/7\*1/2 = 39/77

P(E2|A) = P(A|E2)\*P(E2) / P(A) = (2/7 \* 1/2) / 39/77 = 11/39

So, the probability that it was drawn from Bag -II is 11/39.

**2.3.1**

Answers:

Let E1 be the event of driving car, E2 the event of walking, and E3 be the event of riding bus.

And Let A be the event of working late

P(E1)=0.3, P(E2)=0.2 and P(E3)=0.5

P(A|E1) = P(working late when he drives car) = 0.03

P(A|E2) = P(working late when he walks) = 0.07

P(A|E3) = P(working late when he rides bus) = 0.10

P(A) = P(A|E1)\*P(E1) + P(A|E2)\*P(E2) + P(A|E3) \*P(E3) = 0.03\*0.3+0.07\*0.2+0.1\*0.5=0.073

P(E3|A) = P(E3)\*P(A|E3) / P(A) = 0.5 \* 0.1 / 0.073 = 0.684931

**2.3.2**

Let B the event of working on time.

P(B|E1) = P(working on time when he drives car) = 0.97

P(B|E2) = P(working on time when he walks) = 0.93

P(B|E3) = P(working on time when he rides bus) = 0.90

P(B) = 1 - P(A) = 0.927

P(E2|B) = P(E2)\*P(B|E2) / P(B) = 0.2 \* 0.93 / 0.927= 0.200647